Cleveland Municipal Airport
Cleveland
Cuyahoga County
Ohio

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

Historic American Engineering Record
Heritage Conservation and Recreation Service
Department of Interior
Washington, DC 20243

CLEVELAND MUNICIPAL AIRPORT
(CLEVELAND HOPKINS INTERNATIONAL AIRPORT)
HAER-OH-2

LOCATION: Cleveland, Cuyahoga County, Ohio, 9 miles southwest of Public Square, downtown Cleveland, on state route 237 (Rocky River Drive).
UTM
Quad:

DATE OF CONSTRUCTION: Originally constructed 1925-1929. Continual changes to date, with rennovations in 1936-1938, substantial changes including demolition or original structures 1954-1956, and extensive rennovations 1975--.

PRESENT OWNER: City of Cleveland.

PRESENT USE: Public airport serving major airlines.

SIGNIFICANCE: First municipally constructed and owned airport in the country. Served as a model for American airport design, and pioneered air traffic control through the use of a radio-equipped control tower in 1930. It was the site of the famous Cleveland National Air Races from 1929, 1931-39 and 1946-49, and also the location of a major B-29 bomber plant during World War II. The present airport exists on the same land appropriated through a municipal bond issue in 1924, with some additional land acquired since that time. All original structures have been demolished, although some of the early control tower structure and equipment are at the Smithsonian in Washington, D.C.

HISTORIAN: Edward Jay Pershey, August, 1978

INTRODUCTION

In 1925 when the city of Cleveland opened its municipal airport, the first such funded facility in the nation, the airplane landing field was an oddity, a new feature of the urban and suburban landscape. It had not yet, and would not for some time, become the municipal gateway welcoming strangers who had come to live, work and play. The people who envisioned and built Cleveland Municipal Airport saw beyond 1925. Their vision was askewed in some ways, but it was daring enough to keep Cleveland at the forefront of airport and aviation development in America and the world for almost 30 years. As with many technological innovations, this forerunner, after leading the way for so long, by the fourth decade of its existence found itself falling behind, becoming inadequate and playing the expensive game of technological "catch-up".

A new Cleveland Hopkins International Airport, a third generation facility still under rennovation in 1978, greats traveler, now with all the amenities and comfort expected of a major airport. It rests on the same ground, in the same location as the first airport which served the city from 1925 to 1955, but technologically it is a completely new facility. This is a report about Cleveland Municipal Airport, the first facility, as it served the city from 1925 until just after World War II.

II BUILDING CLEVELAND MUNICIPAL AIRPORT

Cleveland Municipal Airport rested on 1,040 acres of relatively flat land located approximately 11 miles southwest of the city's Public Square in downtown. At its perimeter were the tracks of two railroads, an improved state highway with an interurban electric rail line, and at one corner the terminal point of a city bus route. The trip from downtown to the airport took a little over 30 minutes.[1] Along the eastern boundary of the field were located the administration building with its control tower, and privately built hangers on land leased from the city. Along the western edge were the offices and grandstand of the National Air Races. The central area contained the runways, landing areas and taxi strips.[2] The airport remained essentially and visibly unchanged from 1929 to World War II. The few major changes--additional hangars, the WPA paving project of 1936 and the installation of the National Advisory Committee for Aeronautics' (NACA) research station at the site of the air race facilities--did not alterably affect the scale and proportions of the airport.

In 1919 the city of Cleveland had participated in air mail experiments with the U.S. Postal Service, using Woodland Hills Park on the city's east side as a landing place and tranfer point for the bags of mail. In 1920 the operation was moved to Glen Martin field, also

PREFACE

The important role that Cleveland Municipal Airport (now Cleveland Hopkins International) played in the development of commerical aviation and air mail service in this country in the years 1925 to 1945 cannot be overstated. Significant technological innovations during this period acquired for Cleveland's airport national and international reputations. Radio equipment, field lighting and the unusual use of an omni-directional landing mat instead of runways were the conspicuous features of this large municipal airport at a time when airports were generally neither large nor municipally built.

Critical historical work on Cleveland's major airport and its builder, Major John Berry needs to be done. Available secondary accounts have been produced by city public relations departments and local historians whose main concern has been to praise the foresight and energy of the Clevelanders, native, political and adopted, who worked to give birth to Hopkins airport.

Records of the early operation are not extensive, though photographic records, notably by the Ohio National Guard, do exist. Copies of architectural drawings of the 1929 Administration Building accompany this report. Engineering drawings or planners' drawing have yet to appear from this early period, but pieces or early Hopkins technology are at the Smithsonian are being preserved.

The extant physical airport contains nothing of the first installation, save some drainage pipe along one edge of the field. All landing surfaces and buildings date from the middle 1950's and much later. In view of this, the Historic American Engineering Record's role in writing the history of Hopkins Airport must be questioned. Although technologically and historically significant, present day Hopkins does not offer a site-intensive study which would qualify for the expenditure of large HAER funds.

The following report, then, must necessarily be a prospectus for further serious work on the early airport in Cleveland by a trained historian of aviation and the history of technology and design in America. Such work will entail no "hands-on" techniques since there is nothing left to lay one's hands on. As regretable as this situation may be to a HAER team, the continued rennovation of the airport can be appreciated by those travelers who must fly into and out of Hopkins each day.

I would like to thank John Wolfs, of the Cuyahoga Port Authority; Gunther Katzmar, of the Cleveland Port Authority; Charles Tracy, Aviation Editor of the Cleveland Press, and Willaim Sturniolo, Cleveland City Architect, for their assistance in writing this report. Also, Ms. Margaret Warden, in charge of the Cleveland Public Library's Cleveland Picture Collection, was generous in supplying the photogrpahs used in this report.

on the east side. By 1924, however, the U.S. Air Mail service hand instituted night flying and these fields were not equipped to handle airplane operations at night. Cleveland as a major waystation in the new air mail system was in jeopardy unless suitable facilities could be established. It was this technological watershed, the introduction of regular nighttime flying, that moved the city of Cleveland toward building a completely new field on the other side of town.4 It was the ambition of Cleveland's first, of only two, City Manager, William R. Hopkins, that turned the municipal response of 1924 into a major municipal undertaking that was to expand and grow for over 50 years.

The decision by city government in Cleveland to build an airport which would be municipally owned and operated lay within a long tradition in Cleveland of municipal participation in public works. The water supply system since 1854 had been municipally owned and operated, and a municipal power and light plant had been built in 1914. Considering the long battles to gain municipal ownership of the street railway and transit operations, begun by the Progressive mayor Tom L. Johnson but not won until after World War II, the implementation of the municipal airport decision came rather easily and politically painlessly.

City Manager Hopkins proposed the airport officially to the City Council in 1924, but as Tom Johnson had learned earlier, municipal owner ship was blocked by state law. An amendment to the Ohio General Code obtain in 1925 empowered the city to obtain land through the appropriation of funds and the issuance of municipal bonds. An additional amendment allowed the acquistion of land for airplane landing field through the comdemnation of private property, the right of eminent domain.5

With these legalities safely through the state legislature, Hopkins was able to successfully argue his plea for a municipal airport to City Council, where opposition to the plan had rested on the question of municipal subsidy of federal programs (U.S. Air Mail Service) and private enterprise (air lines and air cargo transport), as well as the legal complexities of city acquisition of property.6

In 1925, City Council approved Hopkin's plan, and voted a $1,250,000 bond issue to acquire over 1,000 acres of land, the present site of the airport. This site had been selected by a three-member advisory team composed of Captain Eddie Rickenbaker, WWI flying ace; Major General Mason Patrick, commander of the U.S. Air Service; and Glenn L. Martin, pioneer aviator and Cleveland bomber-plant capitalist. With this professional endorsement of the suitability of the site, City Council approved the purchase of land which was owned by William R. Hopkins--the City Manager! The issue of Hopkins' ownership was never hidden, but caused no legal and little political battles of any consequence, and by July 1, 1925 not only had the land been acquired but the airport officially opened. 8

While Hopkins can be called the father of Cleveland's airport the mother-midwife team who labored to give form to the physical reality were Major John Berry, army civil engineer, and Claude King, electrical engineer, who were reassigned by the U.S. Air Mail Service from laying out the coast-to-coast air mail route to providing Cleveland with adequate land facilities at the new location.[9] Both men remained with the Cleveland airport resigning their federal jobs to take positions as city airport manager and engineer.

Under Berry's supervision city crews worked from May 1 to July 1, 1925, grading 100 of the 1,040 acres level and smooth enough for aircraft landing and takeoff, and installing lights for nighttime operations. While City Council had been generous in appropriating funds for the acquisition of the land, Berry and King found themselves building a major airport almost with their own hands. City crews and equipment had to be scavanged from other departments, and Berry especially became a local legend for his ability to come up with such necessities as tractors, trucks, tools and whatever manpower was needed.[10]

Opening day ceremonies included an official evening dinner in Cleveland's Public Arena Auditorium and events at the airport beginning at 8:30 p.m., including the arrival of the first New York-Cleveland Chicago plane on the new night air mail service, a flying circus and the opening of the Fort Motor Company's air transport service between Cleveland and Detroit. The crowd at the airport that night was estimated at 250,000.[11]

Besides the graded 100 acres and the lights, this embryonic air field had three small (85'x85') concrete block hangars for the use of the mail service. Later one of these became the airport's first administration building. The use of the airfield and its facilities proved to be a new legal problem concerning the leasing by the federal government of municipal property. The Cleveland-U.S. Government lease for the airport land was the first legal document of its kind.[12]

This first Cleveland Municipal Airport contained several features which marked its development over the next twenty years. The balance of this report will focus on each of these elements: the landing field itself, air traffic control, lighting systems, buildings ancillary transportation to the airport, and facilities for the national air races held at the airport during the period.

III THE LANDING FIELD

The actual landing and takeoff surface of Cleveland Municipal Airport presented a unique piece of aviation technology. When the airport was first opened, only 100 acres of the 1,040 had been cleared and graded for aircraft use. Even so, this was more than sufficient for the initial scheduled use by two mail planes per day, and the Ford Transport Airlines to and from Detroit. During 1925, an average of 300 aircraft per month used the field.[13] During the first year of operation "alleys" of landing strips "in all directions" were laid out on the eastern half of the field, with the western half projected to have a duplicate set of strips. One long runway was to run down the center of these two halves. However, during 1926 the entire field was seeded, and the whole field was to be made usable for landing purposes.[14] This use of the entire field, no longer restricted to alleys or runways, was a characteristic feature of Cleveland's airport, and was highly touted by Major Berry who became the airport manager. A 1929 press release by the city, although written by the Commissioner of Information and Complaints, was surely a paraphrase of Major Berry's contention that this idea, later referred to as a "landing mat" or "alley landing field," provided the optimum use of the airport:

> The entire field must be clear--no runways, no center lights, nothing that obstructs the free landing and departure of planes. Runways have been found to be impractible . With several planes arriving at or about the same time and all trying to land along the same runway that will keep them facing into the wind, you can see how congested the air would become. The pilots would have to wait for each other to land. That may be all right now, when there are not so many planes in the air, but it won't be in a few years from now.[15]

Berry was not a pilot, now did he ever apparently go up in an airplane, but he felt that he understood the needs of the pilots for a multi-directional, simultaneously usable landing area. The landing mat concept provided, Berry thought, a solution to air traffic control by relieving possible air and airport congestion.[16]

Multiple, designated runways were the common installation at most other airports, especially in the United States, and were the central element in airport design by leading architects and engineering firms.[17] Cleveland's omni-field was a direct descendent of the earliest landing fields, such as Cleveland's Woodland Hills Park, which were no more than large areas flat and smooth enough to land on.

During the early thirties larger airplanes and air passenger service demanded smoother, paved surfaces. Limited funds allowed only a partial paving of the 5,400 and 4,000 feet were built to provide the longer needed by the larger planes.[18]

In 1936, the Works Progress Administration of Roosevelt's second New Deal, undertook the enlargement and rennovation of American airports. Under this program Berry was able to have large portion of the landing field paved. It was, at the time, one of the largest asphaltic pavements ever constructed, requiring 342,000 yards of asphalt to cover 85 acres.[19] This surface, although susceptible to water seepage and saturation, was thought to be entirely adequate for the 13-ton aircraft then in use, but the anticipated arrival of airplanes of over 30 tons was expected to pose new problems in the near future.[20]

For servicing areas, the porous nature of asphalt would have proven to be a liability, soaking up spilled fuel and oil, and so four acres of 7 1/2 thick concrete were laid in front of the Administration Building, again by the WPA crews.

By 1940 Berry had paved a large portion of the landing mat and proudly boasted that all of Cleveland Airport was "flyable." 21

World War II changed drastically the requirements for landing surfaces at the airport. Through old army connections in Washington, Berry lobbied for an received a B-29 bomber plant to be built at the periphery of the airport grounds, and the finished planes were to be flown directly out of Cleveland airport. Larger, far more substantially constructed runways were needed for the giant B-29's. Awarding of the plant at Cleveland included the construction of two runways, and by the end of the war the airport had eight runways of from one mile to 6,000 feet long, with the addition of three 7,000-foot runways scheduled for completion upon the acquisition of additional land along the northern and eastern edges of the field.[22]

The development of larger, heavier, and faster airplanes led to the abandonment of Berry's landing mat, as well as it changed the profile of all airports from the symmetrical star-like patterns of multi-directional runways to the asymetrical pattern of long narrow runways commonly observed at present day airports.

IV AIR TRAFFIC CONTROL

The "allway" landing mat was a workable idea to the extent that incoming planes could use <u>different</u> parts of the surface at the same time. Major Berry's goal was to control the incoming planes to relieve congestion through maximizing the use of the field. As late as 1940 he contended that "the holding of aircraft at various altitudes over a given port awaiting the clearance of a landing area does not make safety."[23] Berry argued for uniform air traffic control and the pre-eminence of an airport control tower in the regulating of take-offs

and landings, and especially for the promulgation of landing mat fields in connection with these uniform regulations.

Berry and Claude King had incorporated into the new administration building's plans, in 1929, a glass enclosed control tower with a 360° field of view of incoming and outgoing airplanes, and of the ground operations of the airport.[24] This was, in fact, the first such control tower in the country, and it departed substantially from the accepted of low-profile buildings for airports. When Berry and King installed two-way radio communication in conjunction with the visual coordination, about 1930, the Cleveland Municipal Airport established a model for air traffic control which was slowly accepted over the next 25 years.

The resistance to the idea of a radio-equipped control tower came from all parts of the aviation industry, for to adopt this mode of control restricted the new industry in three ways. First, the early barnstorming days of aviation had generated a breed of independent pilots who balked at the instructions from the ground. Second, the expense of erecting and maintaining and operating such towers restricted air transport to those cities large enough to provide funds, either public or private. Third, the use of radio to control air traffic demanded uniform guidelines, a uniform set of verbal communications, and to some extent uniform airport design. The general acceptance of radio in planes, and the growing air traffic gradually made the control tower a vital part of any airport.

The control tower at Cleveland relayed out only directed information for landing, but also weather bureau reports from a teletype connection with the U.S. bureau in Washington. Installed at the Cleveland tower, too, was the radio beacon used as the directional guiding mechanism for the night pilots on the air mail runs.[25]

Claude King held the first government license to use a ground-to-air radio for the purpose of air-traffic control. Until WWII such personnel, at Cleveland and other cities where radio was installed, were municipal or private employees holding government licenses. In 1943 Civil Aeronautics Administration personnel took over these duties.[26]

V FIELD LIGHTING SYSTEM

Since the initial impetus for the construction of Cleveland Municipal Airport had come from the U. S. Air Mail Service's desire to establish regular might flying, the lighting system of the new airport played a critical role in its development. Part of a federal investment of $200,000 at the airport were a 500,000,000 candle-power flood light, a 3,000,000 c.p. identification beacon light, four 1,500,000 c.p. search lights, flood lights on the hangars, and boundary lights of 1,000 c.p.[27]

The main, 1 1/2 billion candle-power floodlight for aircraft ground operations was a carbon-arc lamp, using 110 volts D.C. at 25 amps. The lens spread the light out at 180° at a very shallow angle to the ground. The light was used for takeoffs and landings. It was so intense that it temporarily blined the pilots who swung their planes towards it as they maneuvered into the wind. Claude King devised the method of standing in front of the lamp to cast a shadow on the pilot only, and then to follow the movement of the plane down the field. Later a mechancial shadow bar replaced the human intervestionist.[28]

The boundary lights established the outline and extent of the field, and were standard airport technology. About three feet hight, and 1,000 c.p., they were colored either white, green or red. White marked the perimeter of the field. Green located the favorable approaches to the better areas of the landing mat or the location of runways. Red warned of an obstacle or particularly unfavorable approach, and flashed at 60-100 times per minutes to indicate a major tower or tall obstacle. The white boundary lights werw spaced 200-300 feet apart, and the green and red lights placed where needed.[29]

VI BUILDINGS

The first buildings at the new airport in 1925-26 were mainly hangars for the airplanes of the air mail service and serval private aviation companies. The three Postal Service hangars mentioned previously were turned over to the city by 1928, and torn down by 1929.

Privately built hangars, on property leased from the city, were the Ford Motor Company hangar (90' x 100'); the Thompson Aeronautical Corporation hangar (70' x 100'); Stewart Aircraft Company (70' x 100'); and a Duncan Airways hangar. The Ohio National Guard was a major tenant of the new airport with a 100' x 120' hangar.

By 1929 several new buildings appeared at the airport, including a new administration building to replace the make shift offices of the former air mail hangar. The new building contained a waiting room for air passengers, a small ticket office, dining hall with kitchen, mail room, baggage room, weather bureau and pilot's facilities.[31] The architecture was a classic example of a symmetrical public building, with hints of art deco decorations. It reflected the symmetry of the design of the airport itself, as being practiced in America at that time. Major Berry declared it obsolete when it opened, since the design did not lend itself to expansion, but with a single major alternation in the late 1930's this building was able to handle airport traffic until the mid-1950's.[32]

An important feature of the new building was the observation tower placed on top of the second story. This steel and glass 16-foot octogonal room allowed a 360° field of view of the air space surrounding the airport. On top of the observation tower a neon-lighted wind tee served as both a day and night wind direction indicator for pilots. During 1930 Berry and King equipoed this tower with a ground-to-air radio transceiver, giving Cleveland Municipal Airport the first such equipped control tower in the country. In 1935 plans for the expansion of the administration building were drawn up, plans which included a new control tower. By 1938 these rennovations were completed. The new control tower, of copper, steel and glass, measuring 12 feet across, also octogonal, was welded onto the old tower, the glass roof having been removed. The floor of the new tower was 8 1/2 feet higher than the level of the old observation room floor. The illuminated wind-tee was replaced with a weather-instrument package and antenna.[33]

Although extensive additions and renovations of the administration were planned in 1935, including the addition of two wings on both the north and south elevation, only an extension on the west side of the building (that facing the flying field) was actually added. The waiting room was moved into this new wing, and the old waiting area became a walk-through lobby.

A new terminal building built in 1954-56 rose in an area just north of the older building, which was not razed until the new terminal was ready for use. Present rennovations at the airport have been built around that second structure, the present south concourse approximately occupying the site of the first building of 1929.

Other building erected by 1929 included a passenger depot and hanagar for the Universal Air Lines, which was part of the New York Central air-rail trans-continental route. On the site of the three original block house hangars of the air mail service the Austin Company of Cleveland a national leader in the design and construction of hangars, erected a chain of hangars, runing parallel to the field north of the administration building. In this Austin chain of buildings was a large 125' x 200' hangar with a clearance of 20' under the roof trussess. These trusses were cantilevered, as were the doors which, in eight sections of 25' width, allowed the full front of the hangar (along the 200' dimension) to be opened, or any 25' section thereof. The opened doors served as a 20' canopy over the entrance when opened. The opening and internal space allowed for a potential wing span of 190 feet. This row of hangars was demolished in 1955 for the expansion of gate facilities in conjunction with the new terminal.

Other hangars from this period included those of the National Air Transport (124' x 120'), Skyways Inc., and the Cleveland Institute of Aviation.

The U.S. Department of Commerce established a radio station in one corner of the field, as one of the stations of the new Airways Communications Service. This station had two small buildings and two 170' steel masts.[34]

The next major building program came with the NACA research lab which was established in 1940 in the southwest corner of the airport. Expansion of that facility in the 1950's into the Lewis Research Lab caused the airport to expand in the opposite direction.

VII TRANSPORTATION TO THE AIRPORT

Getting to the new Municipal Aiport in 1929 involved a 30 minute rar ride from Public Square, nearly 11 miles away. Distance from the city did not deter people from using the airport for both transportation and recreation. Sunday crowds of 70,000 watching the airport activity from the perimeter roadways were common sights in the early years.35

As early as 1926 rapid transit service to the airport seemed to be the logical answer to cutting travel time from downtown. Major Berry reiterated this idea several times, especially in a 1945 report on airport expansion. The present Regional Transit Authority airport rapid, begun in 1968, makes the downtown to airport run in 19 minutes, or 2/3's the auto time it took in 1926.

A local helicoptor taxi service were available in the 1950's, but this proved to be financially impractible and lasted only a short time.

From May of 1928 until the end of January, 1931, the Southwestern Interurban Railway, operating between Cleveland and Mansfield, Ohio, ran trains from Public Square to the airport. Often the interuban line abandoned the track to the complex Cleveland Railway Company streetcars used the line sporadically during the 1930's. The last time a streetcar ran to the airport was on Labor Day, 1939, for the Cleveland National Air Races.36

The airport can now be reached directly, again, by rail.

VIII NATIONAL AIR RACES

The National Air Races, started in 1929, had their birth place at the Cleveland Municipal Airport, largely because of the huge expanse of flying field. In 1930 ballon races were held at the airport, and the next year the air races, with the exciting low-level pylon racing, returned to Cleveland, and remained at the airport each year. The races were held from 1931 to 1939, and again in 1946-49. Extensive bleachers and administration building were erected along the western boundary of the airport, opposite the commercial service area. Scheduled flights were not interrupted by the events. NASA in the 1950's expanded onto the site of the original air race facilities, which no longer exist. National Air Show is now held annually at the city's Burke lakefront airport near the downtown district.37

IX POST WWII & SUMMARY

The first Celveland Municipal Airport became a focus of activity during the second World War. A stream of newly built B-29 bombers used the government constructed concrete runways at the airport to first stretch their steel wings. By war's end, the face of the airport had changed as had the aircraft flying in and out. By the late 1940's and early 1950's it became apparent that the administration building and hangar facilities no longer met the needs of a growing aviation industry, and the middle 1950's marked the gradual replacement of Cleveland Municipal Airport by Cleveland Hopkins Airport (although the name change occured first). By 1956, when the original administration building and hangar row had been destroyed, the Cleveland Municipal Airport ceased to exist, and on its site a second and now a third airport was built. The original airport, as both a pioneer facility and as a model for American airport development in the 1930's, was a center a aviation activity and public interest in flying. Its allway landing mat and control tower were novelties in 1930, one discarded and the other accepted as standard airport design. Hopefully this report will stimulate further research into Cleveland Municipal Airport and the development or airport design in America, for the two are intimately and inseparably related.

NOTES

The introductory quotes on page iii are from Jay Morton, "Cleveland's Municipal Air Port", National Municipal Review 15 (September, 1926) p. 511; and Wesley L. Smith, "How I Fly at Night", Society of Automative Engineers Journal 19 (September, 1926): p. 233.

1. Morton, p. 513, and "Development and Operation of Cleveland Airport", Airway Age 9 (August, 1928), p. 14 The latter hereafter cited as "Development".

2. "Cleveland Improves Airport During Last Year", Airway Age 10 (August, 1929): p. 1198. The article has a retouched map locating features at the airport. Hereafter cites as "Improve".

3. Charles Tracy, "Airport to be 50 Years Old," Cleveland Press, June 4, 1975, p. K-2. Tracy is aviation editor for the newspaper and is quite knowledgeable about Hopkins' history.

4. Annual Report to the Division of Airports, City of Cleveland, 1927, p. 1. These reports, titled "Cleveland Municipal Airport," are brief, two to three typed pages, statements summarizing the work at the airport. They are indentical or nearly identical to the press releases, of the same title, issued by the Division of Information and Complaints, City of Cleveland. The reports, as well as the releases, differ little from 1927 to 1931, with only minor alterations and additions.

5. Morton, p. 512.

6. Morton, p. 511.

7. Tracy, p. K-2.

8. "Development", p. 14; Tracy, p. K-2, and John Berry, "Cleveland Municipal Airport", Division of Airports, City of Cleveland, August 21, 1946, p. 1.

9. "Development", p. 14; Tracy, p. K-2.

10. Roelif Loveland, "The Untold Story of Cleveland's Airport", The Torch, October, 1928, pp. 24. Loveland relates this aspect of the building of the airport, though much of it is probably apochryphyl and all of it anecdotal.

11. "Development", p. 14.

12. Morton, p. 512.

13. "Development", p. 14.

14 Morton, p. 513.

15. "Cleveland Municipal Airport", Division of Information and Complaints, L. Clark Commissioner, 1929, p. 1.

16. Berry, 1946, pp. 1-2. See also Ai

17. See for instance Lehigh Portland Cement Company, American Airport Designs, (New York: Talyor, Rodgers & Bliss, 1930). This publication listed and gave graphic examples of the winners of a competition on airport design held in 1929.

18. William Ganson Rose, Cleveland: The Making of a City (Cleveland World Publishing, 1950), p. 901. This is the standard history of Cleveland, and is basically a chronology, though detailed and accurate.

19. Lester Bauman, "Cleveland's Landing Place", Case Alumnus, January, 1937, p. 8. The paved surface was composed of five different layers, in order of the lowest to the topmost: "5 inches of water bound macadam, 2 1/2 asphalt penetration course, 1 1/2 of T-60 surface, and a seal coat of 0.4 gallons of A-1-a, and 12 pound of limestone chips per square yard". For a graphic description of available surfaces in 1929, with their relative merits, see the Austin Company, Airport and Aviation Buildings (Cleveland: The Austin Company, 1929). The 1936 installation does not differ substantially from the description of "Tarvia Re-Tread" with the substitution of asphalt for the layer of stone, ibid., p. 12.

20. Bauman, p. 9. Bauman was the resident engineer on the WPa project in Cleveland.

21. Berry, 1946, p. 1.

22. "Plan for Expansion of Airport Facitilies of Greater Cleveland", Report of the Committee on Airports of the Cleveland Chamber of Commerce, (Cleveland Chamber and Commerce, 1945) n.p.

23. John Berry, "Uniform Airport Traffic Control", The Paper presented at the Chicago meeting of National Safety Congress, Aeronautical Section, 1940, p. 3.

24. This tower and its equipment are preserved at the Smithsonian in Washington, D.C. though is probably the 1935 addition that is being kept intact.

25. "Cleveland's Airport", Annual Report, 1929, p. 2.

26. "Hopkins International Airport Fifteeth Anniversary", chronology prepared by the Division of Airports, City of Cleveland, June 26, 1975, p. 2. (Mimeographes).

27. "Cleveland Municipal Airport", Division of Information, City of Cleveland, 1927, p. 2; "Development", p. 15.

28. Tracy, p. K-2.

29. "The Lighting of Airports", American City 38 (March, 1928): p. 104-106; see also "Lighting Equipment for Airways, Airports and Airplanes", Society of Automomtive Engineers Journal 19 (September, 1926): p. 309-319.

30. "Development", pp. 15-15. Yearly rental for the land, paid to the city, was $1,000 for each plot of 125 x 250'.

31. "First Floor Plan," Job 30, Sheet 2 and "Second Floor Plan," Job 30, Sheet 3, Administration Building, Cleveland Airport, Division of Architecture, City of Cleveland, February 21, 1929.

32. Tracy, p. K-2.

33. "Additions and Alterations to Cleveland Airport", Job 80, Sheet 10, Division of Architecture, City of Cleveland, March 28, 1935.

34. "Improves', pp. 1199-1200.

35. "Development, p. 14.

37. "Hopkins International Airport Fiftieth Anniversary," pp. 1-2.

36. Henry Christianson Trolley Trails through Greater Cleveland and Northern Ohio from 1910 to Today, WRHS, Published #134. (Cleveland: WRHS, 1975), p. 474.

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"Cleveland is a 450-Million Candlepower Town" U.S. Air Services 13 (September, 1929): p. 21-24.

"Development and Operation of Cleveland Airport" Airway Age 9 (August, 1928): p. 14-17.

"Hangar at Cleveland" Popular Aviation April, 1928, p. 52. The Thompson Aeronautical Corporation hangar.

"History of Cleveland Hopkins Municipal Airport" Division of Airports, City of Cleveland, n.d., n.p., 3 pp. Probably prepared for fiftieth anniversary in 1975.

"Hopkins International Airport Fiftieth Anniversary" Division of Airports, City of Cleveland, June 26, 1975, 4pp. Sketchy chronology used for anniversary events.

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